

# Rheumatic Fever/Rheumatic Heart Disease Prevention: Lessons Learned

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## INTRODUCTION

Rheumatic Fever/Rheumatic heart disease (RF/RHD) is the most common cardiovascular disease in children and young adults. It is a major public health problem in developing countries. RF/RHD is both a biological and a social problem.

Rheumatic Fever/Rheumatic Heart Disease (RF/RHD) was a devastating childhood disease in economically developed countries in the 19th century, declining slowly but steadily after 1900 and becoming more pronounced after the 1940s. A really dramatic decline occurred in the late 1960s. To date its occurrence is nil or very low, with an incidence below 5.0 per 100,000 per year, and a prevalence below 0.5 per 1000 schoolchildren.

There are several reasons for this marked decline: the steady improvement in standards of living, mainly during the pre-antibiotic stage, and the benefits of improved medical care, especially the introduction of antimicrobial agents in the secondary and primary prevention of RF/RHD, and also natural changes in virulence and other associated properties in group A streptococcal strains. However, the small outbreaks of RF which occurred in the mid-1980s in some cities of the USA and other countries show that other factors, not well-known, may play a role in the fall and rise of RF/RHD occurrence.

In contrast, RF/RHD was believed to be a rare disease in tropical and sub-tropical countries during the 19th century. However, since the 1940s it has become a significant health problem in these regions, and often with very severe effects similar to those observed in Europe a century ago.

## LESSONS LEARNED

In the absence of a safe and effective antistreptococcal vaccine, the main activities for RF/RHD prevention and control have been conducted towards:

- improvement in standards of living,
- improved access to medical care,
- introduction of antimicrobial agents in the secondary and primary prevention.
- Planning development and implementing feasible programme for the prevention and control of the disease

WHO has been concerned with RF/RHD prevention and control since 1954 when was held the first WHO meeting on this subject, "the WHO Expert Committee Meeting on Rheumatic Disease" (TRS No 78, 1954). Since then, several WHO Expert Committees have directed their efforts towards public health practices with regard to the study, prevention and control of group A streptococcal infections and RF/RHD ([Figure 1](#)). Their recommendations have been followed, either as general or specific policy for the Ministries of Health of most of WHO's Member States, and as the strategy of large numbers of physicians working in the RF/RHD field. The result has been a marked decrease in the occurrence and severity of RF/RHD in several countries.

## RHEUMATIC FEVER/RHEUMATIC HEART DISEASE (RF/RHD) PREVENTION AND CONTROL WHO ACTIVITIES

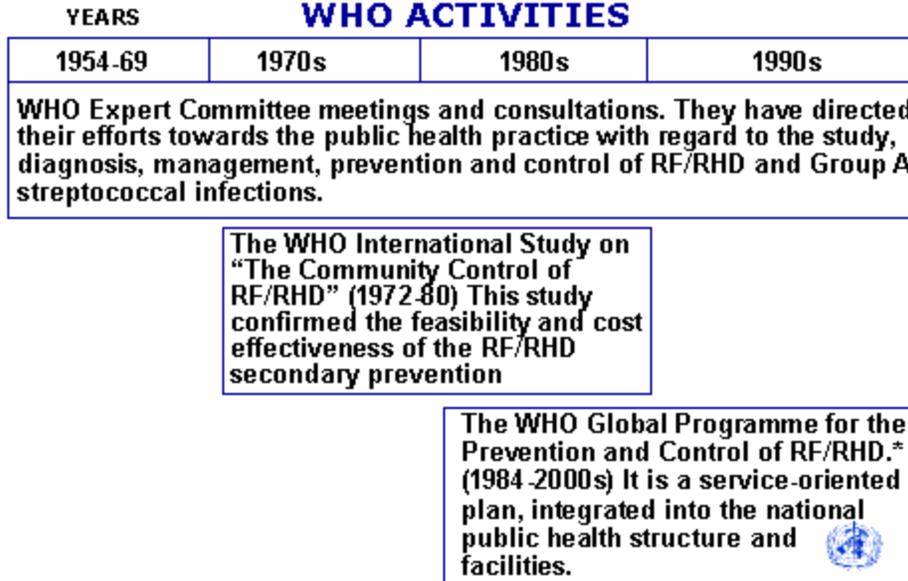


Figure I

Several community-based programmes have been implemented in different countries including the RF/RHD register, follow-up and secondary prophylaxis, as well as some comprehensive programmes on the prevention of RF/RHD integrated into the health care system and facilities of the country, including both primary and secondary prophylaxis. Such programmes have attained relevant decreases in mortality, prevalence, incidence, hospital admissions and severity of RF/RHD. Patients on irregular or no secondary prophylaxis have a high recurrence rate (5.5 to 25.0% of patient-years) and severe RHD.

The challenges of these programmes have been:

- To reduce morbidity, mortality and disability caused by RF/RHD and its complications.
- To reduce the occurrence and severity of Group A streptococcal infection and its suppurative and non-suppurative complications.
- To establish at least one local/regional centre implementing RF/RHD prevention strategy, as initial stage for nationwide coverage, in participating countries
- Upgrade the role of primary care and paediatric services in prevention and control of RF/RHD and streptococcal infection.

These programme have used various procedures for the prevention and control, all based on the secondary prevention of RF/RHD with or without the primary prevention approach strategy and actions. ([Figure II](#)).

## STRATEGY AND ACTIONS

### Key components:

**Primary prevention activities: (Whenever feasible)**

**Secondary prevention activities: In all programmes**

**Technical procedures: Personnel training, medical information, health education, community participation, improving socio-economic condition\* and improving medical care of children, particularly RF/RHD patients.&**

\* In some studies

& Through comprehensive care programme or integrate in the routine health care of the country



Figure II

The Rheumatic Fever/Rheumatic Heart Disease Comprehensive Programme for Prevention in Baltimore,

USA, 1960-1981 achieved a marked decrease in incidence rate per 100,000 from 14.0 in 1965 to 1.0 in 1981-83, in the later years cases were clinically mild. The decline was more in cases preceded by clinically overt acute pharyngitis. Initially more market in black people of the inner city and later in both black and white. (Figure III). The WHO community control of RF/RHD 1971-79 (based on secondary prevention) achieved a marked decrease in recurrence rate (89.3%) and number of streptococcal infections (66.2%), with a decline in the severity of the disease, disability and early death among the 3382 patient-years under regular B-penicillin prophylaxis, with an evident cost-effectiveness through reducing the health care expenditure by limiting the number of days spent in hospital (Figures IV and V). Prevention of rheumatic fever in Costa Rica. 1970-91 (based, mainly, in primary prevention) achieved a progressive decrease in incidence from 90.0 to 1.0 per 100 000 between 1970 and 1990. Few adverse reactions to B. penicillin. No deaths from acute RF in 1990. Marked decrease in number of RHD death, disabled and patients requiring heart surgery. (Figure VI). RF/RHD a comprehensive programme for prevention, Havana, Cuba 1972-87 (primary and secondary prevention) achieved a decrease in incidence of RF from 38.1 to 10.6 per 100,000 and prevalence of RHD from 1.7 to 0.2 per 1,000 between 1972 and 1987. No deaths from acute RF with a marked decrease in the severity of RHD, patients requiring heart surgery, and RHD deaths (Figure VII). The natural history of rheumatic fever in Kuwait 1976-85 (secondary prevention) achieved a disappearance of mitral murmur (RHD) in 77 % of 66 cases under regular secondary prophylaxis, and a decrease in number of disabled cases and patients requiring heart surgery for RHD. No deaths from RF/RHD (Figure VIII). 10-year educational programme aimed at rheumatic fever in two Caribbean Islands (Martinique and Guadeloupe) in young people (<20 years) 1982-92 (both primary and secondary prevention) achieved a decrease in number of new RF/RHD cases (incidence per 100,000) 78%; severe carditis 92% of annual cases, heart surgery from 5 to 0, and in the annual direct cost of RHD, from 1.4 million US\$ in 1982 to 100,000 in 1992. Total cost of programme US\$89,000, mainly for two programme managers, training personnel and health education (Figure IX) RF/RHD. Comprehensive programme for RF/RHD prevention. Pinar del Rio, Cuba 1986-96 (Primary and secondary prevention) achieved a marked decrease in incidence of RF from 34.3 to 2.7 per 100,000 schoolchildren and prevalence of RHD from 2.9 to 0.2 per 1,000 schoolchildren between 1986 and 1996. No deaths from acute RF. Decrease in the severity of RHD in 5 to 25 years old between 1986-90 and 1991-95; recurrence attack, 134 to 59, with sequelae, 25.4 to 20.3 %, heart failure, 11.2 to 5.1% and requiring surgical care, 4.5 to 1.7%. The estimated cost for RF/RHD care decreased from US\$264,000 in 1986 to US\$26,000 in 1996. (Figure X).

### RHEUMATIC FEVER/RHEUMATIC HEART DISEASE COMPREHENSIVE PROGRAMME FOR PREVENTION BALTIMORE, USA

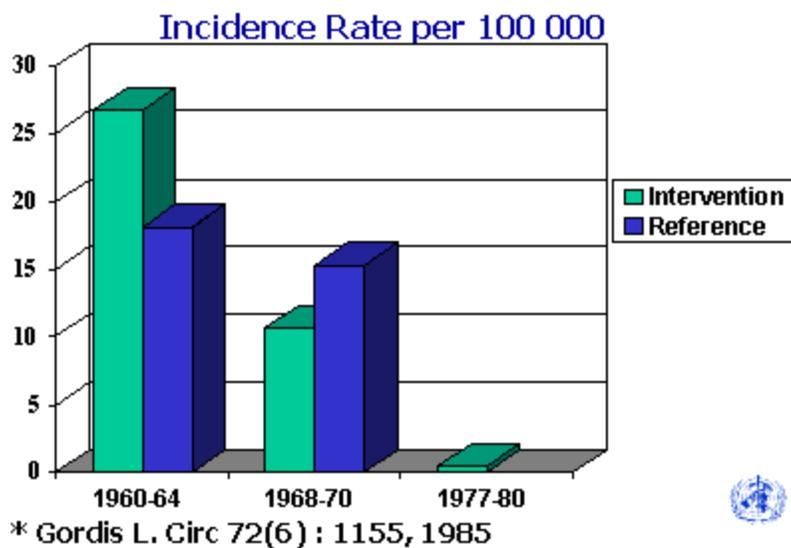
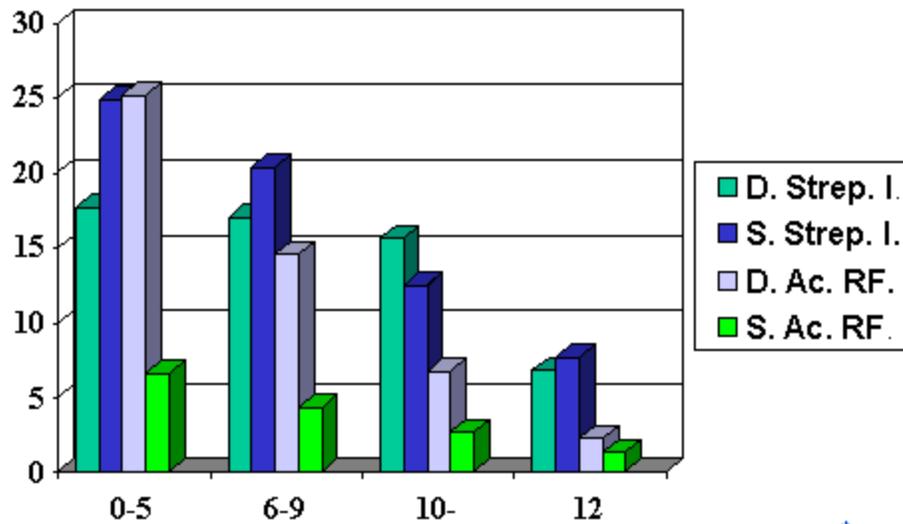


Figure III

**THE WHO COMMUNITY CONTROL OF RF/RHD  
RECURRENCE OF STREP.INFEC. AND ACTIVE RF**



\* Strasser T., Bulletin of the World Health Organization, 59(2): 285, 1981

Figure IV

**THE WHO COMMUNITY CONTROL OF RF/RHD  
Hospital admissions and days spent in hospital by  
level of prophylaxis**

VARIABLE	PENICILLIN INJECTIONS PER YEAR		
	0 - 9	10 - 11	12
Patients years	2117	919	2463
Hospital admissions (%)	470 (22,2)	136 (14,8)	263 (10,7)
Number of hospital days	7876	1646	1150
Hospital days/year	3.7	1.8	0.6

\* Strasser T., Bulletin of the World Health Organization, 59(2): 285, 1981

Figure V

**Prevention of Rheumatic Fever in Costa Rica\*  
(Primary and secondary prevention)**

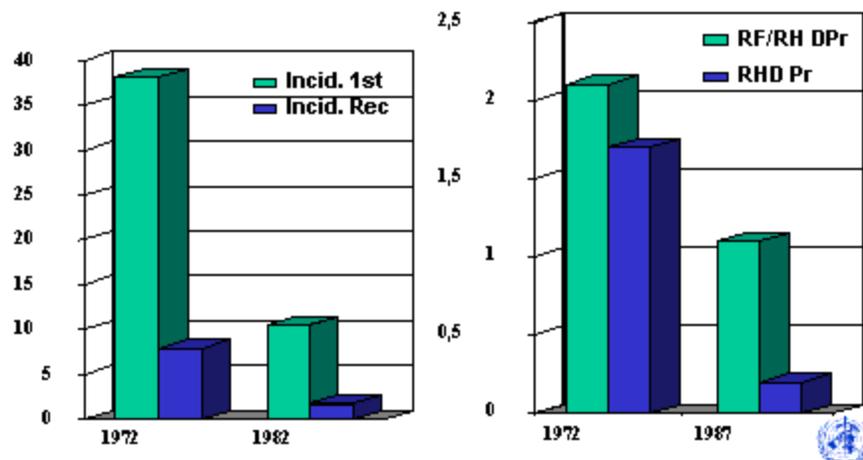
Variable	Year	
	1970	1990
Acute rheumatic fever incidence (per 100 000)	90.0	1.0
RF/RHD deaths in schoolchildren (% of all deaths)	25.0	0.0

Mainly, based in clinical diagnosis and early treatment of streptococcal pharyngitis, and the use of B. Penicillin. There was no death and few anaphylactic reaction to B. Penicillin, and no increase in bacterial resistance to Penicillin  
*J. Pediatr; 121:569-72, 1992*

Figure VI

## RHEUMATIC FEVER/RHEUMATIC HEART DISEASE COMPREHENSIVE PROGRAMME FOR PREVENTION. HAVANA, CUBA

Incidence per 100 000 and Prevalence per 1000



\* Source : Nordet P, Rev. Cub. Ped. 40(2): 32, 1988 and 61 (2): 228, 1989

Figure VII

### The natural history of acute Rheumatic Fever in Kuwait: A prospective six-year follow-up report

Secondary prophylaxis	Number of cases	Carditis at the initial attack with heart murmur		Recurrence		Residual RHD	
		N°	%	N°	%	N°	%
Regular	66	31	47.0	2	3.0	15	23.0
Irregular *	60	30	50.0	47	78.0	23	38.0

\* One patient died and RHD were more severe in the irregular group  
Majeed H A et al, J Chron Dis 39:361-369, 1986

Figure VIII

### 10-year Educational Programme aimed at Rheumatic Fever in two Caribbean Islands (Martinique and Guadeloupe) 1982-92 in young people (< 20 years) (Relevant achievements)

Variable	Changes from 1982 to 92 (% of reduction)
New cases of RF/RHD (Incidence per 10 <sup>5</sup> )	From 19.6 to 1.5 (- 78.0%)
Severe Carditis (N°. cases per year)	From 23.0 to 2.0 (- 92.0%)
Heart surgery requirement (N°. cases per year)	From 5 to 0 (- 100.0%)
Direct cost of RHD -Hospital stay and open- heart surgery- (from year 1982 to an average of years 1991-92)	From 1 426 000 US\$ to 100 000 (- 93.0%)
Cost of the programme, mainly, for the two programme managers, training personnel and health education	89 000 US\$

Bach et al, Lancet 347:644-48, 1996

Figure IX

**RF/RHD Comprehensive programme for  
prevention and control.  
Pinar del Rio, Cuba 1986-96  
(Primary and secondary prevention)  
RELEVANT ACHIEVEMENTS**

Variable	Changes from 1986 to 1996 (% of reduction)
New cases of RF/RHD (Incidence per 10 <sup>5</sup> )	From 34.3 to 2.7 (- 92.0 %)
RF/RHD prevalence per 1000	From 8.5 to 2.0 (- 77.0 %)
RHD prevalence per 1000	From 2.9 to 0.2 (- 93.0 %)
Severity of RF/RHD	Marked decrease
Estimated cost	Marked decrease. From 264 000 US\$ to 26 000 (- 91.2 %)

Dr. Lopez R, Thesis for Dr. Sc., P. del Rio, Cuba, October 2000



Figure X

Most participating countries in the WHO Programme for RF/RHD prevention report that the programme has helped in the reduction of morbidity of RF and RHD (reduction in numbers of new cases and recurrent attacks, reduction in number of severe forms of RHD), and reduction in RHD-related premature disability and mortality (Figure XI).

**WHO Programme for RF/RHD prevention.  
RHD prevalence reported from participating Centres<sup>b</sup>**

CENTRE	RHD prevalence/1000 schoolchildren	
	Before programme	During/after programme
Cuba (Pinar del Rio Province)	2.3 (1986)	0.2 (1998)
Egypt (Cairo Governorat)	7.2 (average of 3 governorates outside programme area)	2.3 (1998)
Philippines (Laguna District, Manila)	2.0 (1978)	1.0 (1997-98)
China (Panyu City, Guangdong Province)	0.8 (1986)	0.3 (1998)
India (Urban and rural area, Chandigarh)	3.0 (national average)	1.4
Romania (Bucharest)	-	0.031 (1997) 0.027 (1998)

WHO/WHF consultation on RF/RHD Nov 1999 WHO Doc, WHO/CVD/00.1

Figure XI

An analysis of the procedures and outcomes of these programme confirm the feasibility and cost-effectiveness of RF/RHD prevention and control integrated into the normal infra-structure of the predominant health system of each country.

**CONCLUSIONS AND RECOMMENDATION FROM THESE EXPERIENCES**

Relevant strategic directions are:

- Proven methods for safe and cost-effective prevention and control are available
- A comprehensive long-term strategy must include prevention at all levels
- Interventions should be adequate and sustained
- Intervention should be adapted to the real situation and possibilities of each country/area
- Key components: community mobilization, supportive policy decisions, health reforms, NGOs and industry
- Multisectoral action & policies of other governmental departments
- Integration into the national health system of appropriate health care

In addition, they also stressed that, appropriate case management of symptomatic streptococcal sore-throat is important, because it can:

- reduce the incidence of suppurative and non-suppurative complications;
- reduce the inappropriate use of antibiotics for upper respiratory infections (when medical information and health education on RF prevention are effective);
- reduce the incidence of symptomatic strep-throat and the average level of streptococcal antibody in the community;
- reduce the infection contagion rate;
- alter the chain of transmission of GAPHS and thus diminish the chance of increasing its virulence.

Caution should be taken when using antibiotics, and the development of penicillin resistance should be monitored.

We urge Ministries of Health in all countries where RF/RHD remains a health problem, as well as non-governmental organizations (NGOs) and donor agencies, to intensify their efforts to promote and support the establishment of at minimum a local prevention programme on RF/RHD as an national entry point for a feasible and cost-effective way to decrease RHD. We also urge the scientific community to promote efforts towards further research for developing an antistreptococcal vaccine.

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